

REMARKSPending Claims

Claim 8 has been canceled without prejudice or disclaimer and new claims 23 and 24 have added. Accordingly, claims 1-7 and 9-24 are pending.

Priority

Applicants appreciate the Examiner's acknowledgment of the claim for priority and receipt of the priority document.

Allowable Claims

Claims 10-16 were indicated as being allowable if amended to overcome the 35 U.S.C. §112, second paragraph rejection. Accordingly, Applicants have rewritten claims 10-12 in independent form to respectively include the limitations of intermediate claim 8 and base claim 1, thereby placing these claims in independent form. Further, the rejection under 35 U.S.C. §112, second paragraph has been overcome by amending the phrase in claim 1 according to the Examiner's suggestion. Therefore claims 10-16 should be allowed.

35 U.S.C. §102 & §103

Applicants request reconsideration of the rejection of claims 1-9 and 20-22 under 35 U.S.C. §102(b) as being anticipated by Lowenthal et al. (Lowenthal), U.S. Patent No. 6,035,306 and of the rejection of claims 17-19 under 35 U.S.C. §103(a) as being unpatentable over Lowenthal in view of Tsuchida et al. (Tsuchida), U.S. Patent No. 5,317,727.

Claim 1 has been amended to include the limitations of cancelled claim 8, by reciting that the claimed storage apparatus includes at least one physical storage device and logical-to-physical position conversion means as well as data allocation changing means and allocation changing plan generation means. According to the claimed invention, the allocation changing plans means generates a plan for changing the physical storage positions of data corresponding to the logical storage positions by using the information acquired by the information acquiring means. Lowenthal does not disclose or suggest this aspect of Applicants' claimed combination.

In Lowenthal, the database management system has a function of determining the optimized storage positions of

data. This function is performed by the monitor computer 45 located outside of the storage system which is constituted by a disk array 26. Further, the volume manager 30 disclosed by Lowenthal, which optimizes the storage positions of data, is located outside of the storage system. By contrast, according to the present invention, determining the optimized storage positions of data is performed by the physical storage position managing/optimizing portion 46 included in the storage apparatus control program 40 located within the storage apparatus 10. See Fig. 1, for example. The physical storage posititing managing/optimizing portion 46 optimizes the storage positions of data by using the physical-logical conversion within the storage apparatus 10.

According to the allocation changing plan means included in the claimed combination of the present application, it is possible to perform optimizing of operations other than that for data storage positions such as optimizing for the cache control method. Further, the optimization for the data storage positions, cache control and similar operations can be carried out according to a decision made independently by the storage apparatus. Therefore, the storage system disclosed by

Lowenthal, which relies upon components outside of the storage apparatus, is not equivalent to the storage apparatus claimed by Applicants in claims 1-9 and 20-22, and therefore the rejection of these claims under 35 U.S.C. §102(b) should be withdrawn.

Tsuchida is applied to claims 17-19. Claim 17 sets forth a cache memory and cache memory control means. The cache memory control means of claim 17 is not disclosed or suggested by the cache (buffer) of the Tsuchida system which determines a method of using the buffer corresponding to a query. Specifically, Tsuchida discloses, in the first embodiment, determining whether or not a pre-fetch operation to the cache is to be performed by considering an internal process that is created corresponding to the input query. If it is determined that the pre-fetch operation is to be performed, then it is determined how to perform the pre-fetch operation. See column 4, lines 35-48 of the patent. Further, according to the second embodiment of Tsuchida, the management of the buffer is performed by using a locality set management table which determines a "locality set" corresponding to the query. See column 13, line 60 to column 14, line 3 of Tsuchida.

Accordingly, allocation of a buffer is performed in Tsuchida by the DBMS for every query. See column 15, lines 18-27 of the reference.

In the present invention, the amount of database data, amount of cache usage for the data in the host DBMS and the amount of cache usage in the storage apparatus 10 are calculated to judge the cache effect according to the procedure shown in Fig. 12. Then, as shown in Fig. 16, it is checked if the storage apparatus has a cache effect on data to be accessed. This is not disclosed or suggested by Tsuchida. Accordingly, the combination of Lowenthal and Tsuchida does not render obvious the invention set forth in claims 17-19.

Claims 20-22 are directed to a method of changing storage positions of data stored within a plurality of physical storage devices by a control unit in a storage apparatus. Claims 20 and 22 have been amended to further include converting logical storage positions to physical storage positions at which data can be actually stored within physical storage devices, changing the physical storage positions within the physical storage devices corresponding to the logical storage positions, and generating an allocation

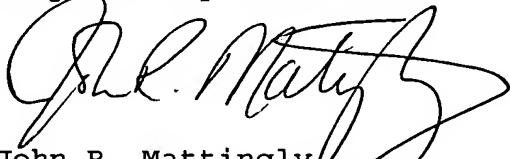
changing plan for changing the physical storage positions of data corresponding to the logical storage positions by using information of data structures including tables, indexes, and logs defined by schema in the DBMS. Accordingly, claims 20-22 are patentable over Lowenthal for the foregoing reasons.

New claims 23 and 24 have been added by Applicants. These claims are patentable over Lowenthal and the remainder of the art of record at least for depending from an allowable base claim. Accordingly, claims 23 and 24 should be allowed.

Conclusion

In view of the foregoing amendments and remarks, Applicants contend that the above-identified application is now in condition for allowance. Accordingly, reconsideration and reexamination is requested.

Respectfully submitted,



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